

Claims

1. Expandable polystyrene composition in the form of expandable beads, characterised in that it comprises by weight :

- (1) 100 parts of a polymer of styrene,
- (2) from 2.2 to less than 4.0 parts of at least one blowing agent, and
- (3) from 0.01 to 0.4 part of at least one plasticising agent.

2. Composition according to claim 1, characterised in that the polymer of styrene has a mean molecular mass by weight, M_w , chosen from a range of from 150 000 to 300 000 daltons, and preferably a molecular weight distribution, calculated by the ratio of M_w to the mean molecular mass by number, M_n , of the polymer, chosen from a range of from 1.8 to 2.6.

3. Composition according to claim 1 or 2, characterised in that the blowing agent is chosen from linear or branched (cyclo)alkanes having in particular 4 to 6 carbon atoms.

4. Composition according to any one of claims 1 to 3, characterised in that it comprises from 2.3 to 3.9 parts, preferably from 2.4 to 3.8 parts, more particularly from 2.5 to 3.5 parts by weight of at least one blowing agent.

5. Composition according to any one of claims 1 to 4, characterised in that the plasticising agent is chosen from mineral oils, white oils, paraffin waxes and Fischer-Tropsch waxes.

6. Composition according to any one of claims 1 to 5, characterised in that it comprises from 0.01 to 0.35 part, preferably from 0.01 to 0.3 part, more particularly from 0.01 to 0.25 part by weight of at least one plasticising agent.

7. Composition according to any one of claims 1 to 6, characterised in that the expandable beads have a size or a diameter chosen from a range of from 0.3 to 3.0 mm.

8. Composition according to any one of claims 1 to 7, characterised in that the expandable beads have a bulk density chosen from a range of from 560 to 700 g/l.

9. Process for preparing the composition according to any one of claims 1 to 8, characterised in that it is carried out in one or more stages and comprises a stage of (co-)polymerisation of the styrene in aqueous suspension.

10. Process according to claim 9, characterised in that it comprises a stage comprising a (co-)polymerisation of the styrene in aqueous suspension carried out in the presence of the blowing agent and the plasticising agent.

11. Process according to claim 9, characterised in that it comprises a first stage of (co-)polymerisation of the styrene in aqueous suspension carried out in the presence of the plasticising agent so as to form beads of a polymer of styrene, and a second stage of impregnation of the beads by the blowing agent more particularly in an aqueous medium.

12. Process for manufacturing medium-density expanded moulded polystyrene objects, characterised in that it employs an expandable polystyrene composition in the form of expandable beads, containing by weight (1) 100 parts of polymer of styrene, (2) from 2.2 to less than 4.0 parts of at least one blowing agent and (3) from 0 to 0.4 part of at least one plasticising agent, and in that it comprises the following stages:

(i) a pre-expansion stage carried out by heating the expandable beads, so as to form pre-expanded beads with a bulk density chosen from a range of from 40 to 190 g/l,

(ii) a stabilisation stage carried out by contacting the pre-expanded beads with a gaseous medium, in particular air, at a temperature of from 0 to 40 °C, under an absolute pressure of from 50 to 160 kPa, for a period of from 6 to 48 hours and

(iii) a moulding stage by introducing and heating the beads thus stabilised into a mould, so as to weld the beads to one another and to form the medium-density expanded moulded polystyrene objects.

13. Process according to claim 12, characterised in that it comprises a single pre-expansion stage followed then by the stabilisation stage and by the moulding stage.

14. Process according to claim 12 or 13, characterised in that in the pre-expansion stage, the expandable beads are heated so as to form pre-expanded beads with a bulk density chosen from a range of from 45 to 180 g/l, preferably from 50 or 60 to 150 g/l,

more particularly from 50 or 60 to 125 g/l.

15. Pre-expanded beads having a bulk density chosen from a range of from 40 to 190 g/l and containing by weight :

- (a) 100 parts of a polymer of styrene,
- (b) from 0.5 to less than 3.0 parts of at least one blowing agent and
- (c) from 0 to 0.4 part of at least one plasticising agent.

16. Pre-expanded beads according to claim 15, characterised in that they are expandable and in particular capable of subsequent expansion without the addition of a fresh quantity of blowing agent.

17. Pre-expanded beads according claim 15 or 16, characterised in that the polymer of styrene has a mean molecular mass by weight, Mw, chosen from a range of from 150 000 to 300 000 daltons, and preferably a molecular weight distribution, calculated by the ratio of Mw to the mean molecular mass by number, Mn, of the polymer, chosen from a range of from 1.8 to 2.6.

18. Pre-expanded beads according to any one of claims 15 to 17, characterised in that the blowing agent is chosen from linear or branched (cyclo)alkanes having in particular from 4 to 6 carbon atoms.

19. Pre-expanded beads according to any one of claims 15 to 18, characterised in that they contain from 0.7 to 2.9 parts, preferably from 0.9 to 2.8 parts, more particularly from 1.0 to 2.7 parts by weight of at least one blowing agent.

20. Pre-expanded beads according to any one of claims 15 to 18, characterised in that they contain from 1.6 to less than 3.0 parts, preferably from 1.7 to 2.9 parts, more particularly from 1.8 to 2.8 parts, especially from 1.9 to 2.7 parts by weight of at least one blowing agent.

21. Pre-expanded beads according to any one of claims 15 to 20, characterised in that the plasticising agent is chosen from mineral oils, white oils, paraffin waxes and Fischer-Tropsch waxes.

22. Pre-expanded beads according to any one of claims 15 to 21, characterised in that they contain from 0 to 0.35 part, preferably from 0 to 0.3 part, more particularly from 0 to 0.25 part of at least one plasticising agent.

23. Pre-expanded beads according to any one of claims 15 to 22, characterised in that they have a size or a diameter chosen from a range of from 0.5 to 3.5 mm.

24. Pre-expanded beads according to any one of claims 15 to 23, characterised in that they have a bulk density chosen from a range of from 45 to 180 g/l, preferably from 60 or 50 to 150 g/l, in particular from 60 or 50 to 125 g/l.

25. Process for preparing pre-expanded beads according to any one of claims 15 to 24, characterised in that it comprises a pre-expansion stage carried out by heating the expandable beads until pre-expanded beads having a bulk density chosen from a range of from 40 to 190 g/l, preferably from 45 to 180 g/l, particularly from 50 or 60 to 150 g/l, in particular from 50 or 60 to 125 g/l are obtained.

26. Medium-density expanded moulded polystyrene objects, characterised in that they are obtained by means of the composition according to any one of claims 1 to 8, or by means of the pre-expanded beads according to any one of claims 15 to 24, and that they have a density chosen from a range of from 40 to 190 g/l, preferably from 45 to 180 g/l, particularly from 50 or 60 to 150 g/l, in particular from 50 or 60 to 125 g/l.